

# CornTalk

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Farmers

Wagner Family  
Hooper, Nebraska

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# Are GMOs A-OK?

Food has become a hot topic in the media and around the dinner table. The production and politics of food are on the minds of policy makers, special interests groups and consumers in general. One of the most talked-about subjects is the advanced science used to produce new plants and organisms through the manipulation of genetic material. In this issue of CornsTALK, we look at genetically modified organisms—GMOs—and provide answers to many of the questions you may have about them.



## GMO FAQ

### What is a GMO?



When creating a GMO or genetically modified organism, researchers copy specific genetic information from one plant or organism and introduce it into another to improve or enhance a specific characteristic or trait, such as resistance to insects. Developing special traits in plants allows for more food to be grown in more places using fewer chemicals and fewer natural resources.

### What's the difference between GMOs and biotechnology?



While the two terms are frequently used interchangeably, biotechnology more closely refers to the process or technology used to create GMOs. You may also see the term “GM”, which of course means “genetically modified.” When you hear farmers talk about “biotech” hybrids or varieties, they are talking about the GM seeds they plant.

### What is a Bt crop?



These are crops genetically engineered to carry a gene from the soil bacterium *Bacillus thuringiensis* (Bt). This bacterium produces proteins toxic to certain pests—caterpillars, mosquitoes and corn rootworm—but do not affect humans and other mammals. The crops that contain the Bt gene can produce the toxin, thus shielding themselves from targeted pests—and reducing the need for pesticides.

### Is genetic modification a new thing?



Manipulating genes in plants is an approach that has been used for centuries to make bread, cheese, wine and beer. Today, nearly every food on grocery store shelves has been modified by human hands at the genetic level. The foods we eat are modified using various breeding methods. Breeding alters a plant's genes so that it expresses new traits. That's how we get those desirable family favorites such as, seedless watermelons and grapes, red grapefruit, peanuts, honey crisp apples and other foods. *(continued next page)*

GMOs and biotechnology simply accelerate this process. “Everything about science is learning new ways to speed up evolution so that we can come up with crops faster than Mother Nature ordinarily would,” said Dr. Sally Mackenzie, Ralph and Alice Raikes Professor of Plant Science at the University of Nebraska–Lincoln. “Genetically modified is a part of our future. If we want to eat with climate change, we will need technologies or we simply won’t survive, and that’s just a reality.”

### Are GMOs safe for humans?

To date, more than 2,000 peer-reviewed studies have confirmed that GMOs are safe for human consumption. While there have been a handful of studies that state otherwise, these studies have been roundly debunked by scientists around the world. With over 25 years of independent research, there is no documented evidence of harm to human health or deaths from consumption of GM foods. (National Research Council, European Commission)

### Are GMOs accepted around the world?

As of 2013, GMOs are grown, imported and/or used in 70 countries. Each of these countries has its own rigorous certification process. Bringing a new GMO to market involves extensive safety and environmental review by regulatory bodies around the world. More than 70 government bodies globally review and regulate GMOs. In the United States, agencies including U.S. Department of Agriculture (USDA), Environmental Protection Agency (EPA) and Food and Drug Administration (FDA) review GMOs.



## 27 COUNTRIES PLANTED BIOTECH CROPS IN 2013

For the second consecutive year, developing countries planted more land areas in biotech crops than industrial countries:

### 19 DEVELOPING COUNTRIES

94.1 Million Hectares/  
232.5 Million Acres

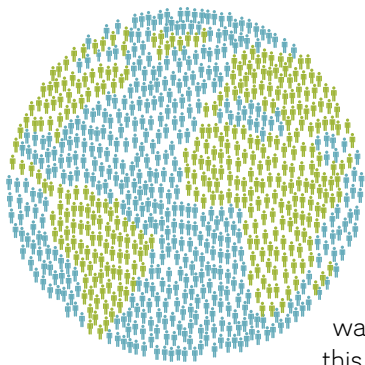
- Brazil
- Argentina
- India
- China
- Paraguay
- South Africa
- Pakistan
- Uruguay
- Bolivia
- Philippines
- Burkina Faso
- Myanmar
- Mexico
- Colombia
- Sudan
- Chile
- Honduras
- Cuba
- Costa Rica

### 8 INDUSTRIAL COUNTRIES

81.1 Million Hectares/  
200.4 Million Acres

- United States
- Canada
- Australia
- Spain
- Portugal
- Czech Republic
- Romania
- Slovakia

THE 4 MAJOR BIOTECH CROPS ARE:  
SOYBEAN, COTTON, CORN & CANOLA



## Can GMOs really help us feed a growing world population?

Nine billion people on the planet by 2050: That's the challenge that faces agriculture. GMOs will help farmers grow more food on less land with less water and chemicals. "If we're going to feed this growing population, farmers around the world—especially those in developing nations—are going to have to produce more," said Alan Tiemann of Seward, a farmer-director on the Nebraska Corn Board. "Biotechnology provides a way for them to fight disease and pests, resist drought and increase yield on the land they already have."

Yet, GMO technology is just one strategy. Reducing food waste, improving distribution, and employing other agricultural methods will also be required if we're going to meet the challenge of feeding nine billion people.

## Are there GMO-free foods?

Genetically modified wheat is not grown in the United States. Genetically modified corn, soybeans and other commodities are approved for production in the U.S. As a result, trace amounts of GM products are found in many processed foods in the form of corn, soybean or canola oils—even when those foods may be labeled "GMO-free."

## Is it safe to eat meat and milk from animals that were fed GMO crops?

Absolutely. A 2012 review of 24 long-term or multigenerational studies found that genetically modified corn, soy, potato, and rice had no ill effects on the rats, cows, mice, quails, chickens, pigs and sheep that ate them. Growth, development, blood, tissue structure, urine chemistry and organ and body weights were normal.

## How do biotech crops affect food prices?

Thanks to reduced input costs and higher yields, biotechnology actually reduces food costs. An Iowa State University study shows that without biotechnology, global prices would be nearly 10 percent higher for soybeans and 6 percent higher for corn.



## How does genetic modification affect nutrition?

There is no difference. Exhaustive testing and FDA review has confirmed that GMOs are nutritionally the same as their non-GM counterparts. They have the same levels of key nutrients such as amino acids, proteins, fiber, minerals and vitamins.

## Do GMOs cause allergies?

No. GMOs do not create new allergens that are not already present due to other unrelated factors. If a person is allergic to a non-GMO plant, they will be allergic to the GMO variety since the two are nutritionally the same.



## Do GMOs cause gluten intolerance?

There is absolutely no relationship because there is no GMO wheat on the market today. If such a product were to come on the market, it could not cause new allergies because standard GM testing and FDA review ensure that GMOs are not introducing new potential allergens.



**The 8 GMO products commercially available in the U.S.**  
**Corn • Soybeans • Sugar beets • Cotton • Alfalfa • Papaya • Squash • Canola**



# Some GMO benefits that may surprise you.

## Not just more food. Better food.

A new generation of GM crops is focused on improved nutrition and human health:

- Golden Rice and vitamin A enhanced cassava will deliver high levels of vitamin A, which is key for a healthy immune system, good vision and cell growth.
- Pineapple with lycopene, which may help prevent lung and prostate cancer.
- Peanuts with very low allergen levels that have the potential to eliminate life threatening peanut allergies
- High carotene mustard seed oil and enriched sweet potatoes are also among the innovations awaiting approval.

- Fungal resistant grapes that enhance mildew resistance.
- Edible vaccines to help prevent a variety of diseases are also in the works.

Scientists are working on an Omega 3 oilseed that would replace wild fish in rations for land based aquaculture operations. This innovation would help reduce overfishing by allowing field grown crops to be substituted for ocean fish.

Biotechnology is also helping improve the consistency, appearance and shelf life of foods—and that will lead to less wasted food.



*GM technology can result in better-tasting fruits and vegetables that stay fresh longer and are naturally resistant to insects. More consistent produce that stays fresh can reduce food waste—and that alone helps increase the supply of food around the world.*

## How GMOs improve the environment.

Biotech hybrids and varieties dramatically reduce the amount of pesticides and herbicides used by farmers. Biotechnology saves the equivalent of 521,000 pounds of pesticides each year and helps cut herbicide runoff by 70%. (Sources: ISAAA, PG Economics)

The Bill and Melinda Gates Foundation is funding efforts to integrate a natural process called “nitrogen fixing” capability into major food crops, starting with corn. Having major crop plants such as corn be able to convert nitrogen in the air into their own fertilizer could significantly reduce the use of nitrogen fertilizers.

“People worried about converting land to grow crops should be especially supportive of GMO technology,” said Tim Scheer, a St. Paul, Nebraska farmer and chairman of the Nebraska Corn Board. “Thanks to biotechnology, we are able to produce dramatically more food on less



land. This is especially important in developing countries that have considerable upward potential for increasing yields. If they can grow more on the land they have, they are less likely to claim more land for agriculture.”

## How biotech crops reduce poverty and malnutrition.

As farmers in India have adopted GM cotton and been able to grow more with less input costs, their income has increased. Because of this, undernourishment in families has dropped as they have been able to afford more calories. If all the Indian cotton farmers adopted this technology, food insecurity would fall by 15-20%.

(Source: PLOS)



# Why an Anti-GMO Activist Changed His Mind



Mark Lynas

Photo Credit: thebreakthrough.org

**E**nglish author and environmental activist Mark Lynas focuses on climate change and has written several award-winning books on the subject. In the 1990s, he was one of the first to come out vehemently against the introduction of genetically modified organisms. Some credit him with actually starting the anti-GMO movement and creating the “Frankenfood” imagery that has plagued the technology since.

Lynas cited a number of reasons for his about-face on GMOs including the reduced use of chemicals, the economic benefits to farmers around the world, and the need to feed more than 9 billion people by 2050 on the same amount of land we have today.

His environmentalist streak continues to be at the heart of his new thinking. “We have to grow more on limited land in order to save the rainforests and remaining natural habitats from the plough. We have to deal with limited water...and droughts that are expected to strike with increasing intensity,” he said. Thousands of scientific studies convinced Lynas that genetically modified crops and foods are safe. “The GM debate is over. We no longer need to discuss whether

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**“You are more likely to get hit by an asteroid than to get hurt by GM food.”**

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But years later, after carefully considering the science behind GMOs and the overall benefits to humans and the planet, Mark Lynas changed his mind—and his January 2013 speech at the Oxford Farming Conference in England made international news.

“I discovered science and in the process I hope I became a better environmentalist,” Lynas said. “I am sorry that I helped to start the anti-GM movement back in the 1990s and that I thereby assisted in demonizing an important technological option that can be used to benefit the environment.”

or not it is safe—over a decade and a half with three trillion GM meals eaten there has never been a substantiated case of harm. You are more likely to get hit by an asteroid than to get hurt by GM food.”

“Farmers should be free to choose what kind of technologies they want to adopt,” Lynas said. “The biggest risk of all is that we do not take advantage of all sorts of opportunities for innovation because of what in reality is little more than blind prejudice,” he added.



## Nebraska Farm Women Meet Their Urban Counterparts to Discuss GMOs



*Joan Ruskamp, a farmer from Dodge, Nebraska, talks with consumers about GMOs and other food issues in her role as a CommonGround™ volunteer.*



### *Conversations About Farming and Food*

CommonGround™ is a nationwide network of farm women dedicated to sharing the story of agriculture with their urban counterparts.

Joan Ruskamp of Dodge, Nebraska, is a Nebraska CommonGround volunteer. She frequently visits grocery stores as part of the outreach initiative to talk directly with consumers about a wide variety of food issues including GMOs.

"The biggest fear I hear from consumers is about what we're doing to food when we genetically alter it—and if we are genetically altering our own bodies when we eat GMOs," she said.

Ruskamp said CommonGround™ talks one-on-one with consumers to help them learn about the science behind GMOs, but in many cases it's an uphill battle.

"Science doesn't seem to be enough to combat the misinformation that is out there regarding GMOs," she said. "The whole world has studied the safety of GMOs from both the human ingestion and environmental perspectives and not one credible study has found any danger or concern. You can bet that if someplace like the European Union had found something in their research for us to be concerned about, the entire world would have heard about it."

Ruskamp cites an example of a GMO that could change the future for millions of children, but instead is currently banned from the marketplace. "Golden Rice, an incredibly beneficial GMO, is being blocked from the marketplace because of pushback from groups like Greenpeace and regulations that simply are not science-based. Golden Rice has been shown to help prevent blindness in newborn infants which is a serious problem in Asia and Africa," she said. "The moms I talk to can empathize with this—and they begin to understand that GMOs can actually be incredibly helpful and healthful."

## A farmer's perspective on GMOs



Nebraska Corn Board director Brandon Hunnicutt farms near Giltner, Nebraska, and serves on the Trade Policy and Biotech Action team of the National Corn Growers Association. He has seen how biotechnology has helped improve the sustainability and environmental stewardship on his farm.

"The less energy our crops have to expend on protecting themselves from pest and weed pressure, the more energy they have available to utilize water and nutrients efficiently to produce more grain," Hunnicutt said. "Healthier plants with strong root systems perform better in every respect."

The use of biotech hybrids has allowed farmers to dramatically reduce the use of pesticides and fuel to raise their crops. "Biotech hybrids have allowed us to use no-till practices, which conserve moisture, reduce irrigation, reduce chemical use and save trips across the field," said Alan Tiemann of Seward, at-large director on the Nebraska Corn Board.

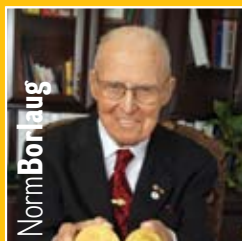
While many nations accept biotechnology and have confidence in the U.S. testing standards, there are still challenges in exporting U.S. corn around the world. "Internationally, there is great inconsistency in the approval and acceptance process for new GMOs," Hunnicutt said. "The nations that use science as the basis for approval are typically accepting of the technology, but there are other nations that are less interested in science and more interested in the politics of protectionism and trade barriers."



"Farmers around the world—including in the European Union—want the opportunity to choose these advancements for their farms," Tiemann said. "But GMOs are a convenient scapegoat or scare tactic used to protect domestic markets or exert political leverage."

Tiemann takes issue with the movement to label foods that contain GMO products. "We don't require oil companies to label the toxic substances in gasoline at the pump—and there is scientific proof that these poisons and toxins cause cancer and respiratory problems," he said. "More than 2,000 peer-reviewed studies have confirmed that GMOs are safe for human consumption. I'm not convinced we need to stick a label on food for something that is proven to be safe."

# The Man Who Saved a Billion Lives



From his humble roots as an Iowa farm boy, **Norman Borlaug** became one of the world's most respected plant geneticists and advocates for addressing food insecurity around the world.

Borlaug was instrumental in using innovative plant breeding and genetics to create new varieties of wheat that transformed the food supply in nations such as India, Pakistan and Mexico. While he did not use today's GMO

technology in his wheat, Borlaug believed that genetic manipulation of organisms is essential to increasing food production as the world runs out of arable usable land. He said, "We've been genetically modifying plants and animals for a long time. Long before we called it science, people were selecting the best breeds."

Norman Borlaug is considered **the father of "the Green Revolution."** He won the Nobel Peace Prize for his contributions to the world food supply. He was awarded the Presidential Medal of Freedom, the National Medal of Science, and the Congressional Gold Medal—as well as India's second highest civilian honor. He has been called "The Man Who Saved a Billion Lives."

In 1997, Borlaug stated, "Unless progress with agricultural yields remains very strong, the next century will experience sheer human misery that, on a numerical scale, will exceed the worst of everything that has come before."

Borlaug created the World Food Prize in 1986 as a means to recognize individuals who have advanced human development by improving the quality, quantity or availability of food in the world.

Borlaug died in 2009, but his legacy lives on as billions of people around the globe are able to eat and sustain themselves thanks to his vision for advancements in crop genetics focused on feeding a hungry world.



The Food Dialogues, sponsored by the U.S. Farm & Ranch Alliance (USFRA), is a series of issues-oriented discussions about food, food production and agriculture. Dozens of Food Dialogues have been held in major cities across the U.S. involving panels of experts representing a wide diversity of opinions and interests.



District 1  
**Dave Bruntz**  
Friend, NE



District 6  
**Dennis Gengenbach**  
Smithfield, NE



District 2  
**John Greer**  
Edgar, NE



District 7  
**David Merrell**  
St. Edward, NE



District 3  
**Brandon Hunnicutt**  
Giltner, NE



District 8  
**Jon Holzfaster**  
Paxton, NE



District 4  
**Debbie Borg**  
Allen, NE



At-large  
**Alan Tiemann**  
Seward, NE



District 5  
**Tim Scheer**  
St. Paul, NE



Nebraska Corn Board members represent the eight districts indicated on the map and are appointed by the Governor. One at-large member is elected by the other Board members.

## Nebraska Corn Board Staff

**Kelly Brunkhorst**  
executive director



**Boone McAfee**  
director of market development & research



**Emily Thornburg**  
director of communications



**Kim Clark**  
director of biofuels development



**Janet Miller**  
business manager



**Susan Zabel**  
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On the Cover The Wagner family from Hooper, Nebraska, raises cattle, corn and other grains.